CLAIMS

1. An exposure apparatus which exposes a substrate by irradiating exposure light onto a substrate via a projection optical system and a liquid, comprising:

a liquid supply mechanism that supplies the liquid; and

a measuring device which measures a time during which the supply of the liquid from the liquid supply mechanism is stopped.

2. The exposure apparatus according to Claim 1, wherein the supply of the liquid from the liquid supply mechanism is restarted when the stopping time exceeds a predetermined allowable time.

3. The exposure apparatus according to Claim 2, wherein the liquid supply mechanism comprises a flowpath that supplies the liquid, and

the allowable time is determined taking a proliferation time of bacteria in the flowpath into a consideration.

4. The exposure apparatus according to Claim 2, wherein the exposure light is irradiated onto the substrate with an end face of the projection optical system contacting the liquid; and

the allowable time is determined taking a drying time of liquid stuck to the end face of the projection optical system into a consideration.

5. The exposure apparatus according to Claim 4, wherein the allowable time is determined such that impurities do not stick to the end face of the projection optical

system due to drying of the liquid on the end face.

6. The exposure apparatus according to Claim 4, wherein the supply of the liquid from the liquid supply mechanism is restarted such that the end face of the projection optical system contacts the liquid.

7. The exposure apparatus according to Claim 2, further comprising a substrate stage which holds the substrate; and wherein,

when the allowable time is exceeded, the supply of the liquid from the liquid supply mechanism is restarted with the projection optical system being arranged facing a flat section of the substrate stage.

8. The exposure apparatus according to Claim 7, wherein the supply of the liquid from the liquid supply mechanism is restarted with the substrate or a dummy substrate held on the substrate stage.

9. The exposure apparatus according to Claim 1, wherein the liquid is pure water.

10. The exposure apparatus according to Claim 1, wherein the liquid supply mechanism comprises a flowpath that supplies the liquid and a valve for opening and closing the flowpath; and

the stop of the supply of the liquid from the liquid supply mechanism is determined from an operation of the valve.

11. The exposure apparatus according to Claim 1, wherein the liquid supply

mechanism comprises a flowpath that supplies the liquid and a flow meter that measures an amount of flow of the liquid along the flowpath; and

the stop of the supply of the liquid from the liquid supply mechanism is determined based on a measurement result of the flow meter.

12. The exposure apparatus according to Claim 2, wherein the supply of the liquid from the liquid supply mechanism is restarted with the projection optical system facing a predetermined object.

13. The exposure apparatus according to Claim 12, wherein the object comprises a stage which can move along the end face of the projection optical system.

14. A device manufacturing method comprising:

using the exposure apparatus according to Claim 1.

15. A maintenance method of a projection optical system which projects an image of a pattern via a liquid, comprising:

measuring an elapsed time from when an end face on an image surface side of the projection optical system becomes in an immersed state to when it becomes a non-immersed state.

16. The maintenance method according to Claim 15, further comprising wetting the end face on the image surface side of the projection optical system with the liquid when the elapsed time exceeds a predetermined allowable time.

17. An exposure method comprising:

exposing, by using a projection optical system maintained using the method according to Claim 15, a substrate to light by projecting an image of a device pattern via liquid onto the substrate.